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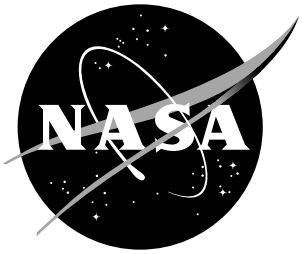

A Succinct Naming Convention for Lengthy Hexadecimal Numbers

Michael S. Grant

October 1997

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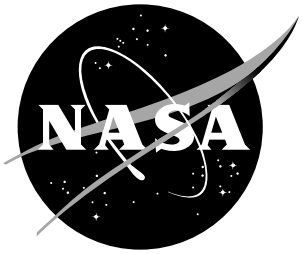

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Abstract

Engineers, computer scientists, mathematicians and others must often deal with lengthy hexadecimal numbers. As memory requirements for software increase, the associated memory address space for systems necessitates the use of longer and longer strings of hexadecimal characters to describe a given number. For example, the address space of some digital signal processors (DSP's) now ranges in the billions of words, requiring eight hexadecimal characters for many of the addresses. This technical memorandum proposes a simple grouping scheme for more clearly representing lengthy hexadecimal numbers in written material, as well as a "code" for naming and more quickly verbalizing such numbers. This should facilitate communications among colleagues in engineering and related fields, and aid in comprehension and temporary memorization of important hexadecimal numbers during design work.

Engineers and computer scientists who design hardware and software for devices such as digital signal processors (DSP's) and general purpose processors, must deal with increasingly long hexadecimal (hex) numbers. One widely used DSP, for example, has a memory address space of 4 gigawords, which is represented as '00000 0000h' to '0FFFF FFFFh'. Unlike decimal numbers, there does not appear to be a convenient or universally accepted way to name and verbalize long hexadecimal numbers. Obviously, as memory requirements expand, the situation will not become easier to deal with.

A convenient, easy-to-remember convention for representing, and most importantly, naming these long strings of hex characters will now be presented. The method was designed to aid in the comprehension of long hex numbers, and to reduce the number of syllables required to verbalize a given number.

First, the characters of a "long" hex number (defined here as one with more than four characters) are placed in groups of four, with a space between each group of characters. This is shown by the following example:

Example 1:	"Ungrouped" Hex Number:	08FFF0000
	"Grouped" Hex Number:	0 8FFF 0000

The "grouped" number is more easily comprehended from written material. Secondly, this four-character grouping is named using a *Hex Group Code*, proposed herein.

Traditionally, the number in Example 1 is verbalized as "zero, eight, f, f, f, zero, zero, zero, zero." This requires a total of 14 syllables be pronounced, and the listener or the reader of technical material will often forget in a short time, if there are three f's or four, etc. This is likely due to the fact that unlike communication of decimal numbers, there seems to be no universally accepted verbiage to denote the

significance of a hex digit. For example the decimal number 8123 may be verbalized as “eight thousand one hundred and twenty-three.” The term “eight thousand” conveys “significance” information, and the hearer knows that the “8” is the fourth digit to the left of the decimal place. A similar attempt at verbalizing the hex number CFFF might be “C-thousand f-hundred and f-itty-f.” Due to the awkwardness of such constructs, they have not gained general acceptance.

Table 1 presents a set of names using the *Hex Group Code*, for some of the more common groups of hexadecimal numbers. Again, the goal of this naming convention is to name groups of characters in a sensible way, in order to aid in comprehending the hex number and to minimize the number of syllables that must be spoken.

Hex Character Grouping	Individual Chars. Pronounced - No. Syllables	Hex Group Code	Code Word Pronounced - No. Syllables
00	4	“bi-zero”	3
000	6	"tri-zero"	3
0000	8	"quad-zero"	3
FFF	3	"tri-f"	2
FFFF	4	"quad-f"	2
(space)	(not generally pronounced)	"s"	1

Hex Group Code Examples

Table 1

Table 1 is only a sampling of the complete Hex Group Code. For example, ‘BBB’ would be “tri-b,” and ‘CCCC’ would be “quad-c,” etc.

Note that an important aspect of this code is the use of an ‘s’ to represent the *space* between the four-character groupings. The ‘s’ explicitly denotes the end of one group and the start of another group when verbalizing the hex number. The importance of using the ‘s’ to delimit groups will be shown in a later example.

A few examples of the use of the Hex Group Code are given in Table 2. These are the type of hex numbers for which the Hex Group Code is most useful.

Example	An Ungrouped Representation (no. syllables)	Grouped Representation	Hex Group Code Verbalization (no. syllables)
T2.1	8FFF0000 (12)	8FFF 0000	"eight, tri-f, s, quad-zero" (7)
T2.2	6000FFFF (11)	6000 FFFF	"six thousand, s, quad-f" (6)
T2.3	0010AAAA (11)	0010 AAAA	"bi-zero, ten, s, quad-a" (7) or simply: "ten, s, quad-a" (4) with no loss of information.

Hex Group Code Examples

Table 2

It is believed that using this Hex Group Code results in a more meaningful mental description when reading a long hex number, than does a traditional unsegmented list of individual hex characters. Additionally, in the author's experience, lengthy hexadecimal numbers must generally be written down to be communicated to a colleague. Thus, the use of this code is also likely to facilitate spoken communications.

The groups of hex numbers named in Table 1 occur fairly routinely, particularly in processor memory maps. It is common for a block of memory addresses to begin with a number containing a group of four zero's (as in 0100 0000h) and end with a number containing a cluster of four F's (as in 0100 FFFFh).

Obviously, the Hex Group Code is most useful with long hex numbers containing three or four identical characters in succession, in every four-character grouping. However, for groups that do not contain three or four matching characters, a group of two characters is used where possible. This is shown by Example 2.

Example 2: 0012 FFFF

This number may be verbalized as:

"bi-zero, twelve, s, quad-f" (Verbalization 2A),

where the first four-character grouping has been further subdivided.

Alternately it may be verbalized as:

"twelve, s, quad-f" (Verbalization 2B),

where the most significant two zero's are left out, with no loss of information.

Another example where four-character groups are further subdivided is given in Example 3.

Example 3: 0127 0B40

This number may be verbalized as:

"zero-one, twenty-seven, s, zero-b, forty" (Verbalization 3A),

or more succinctly:

"oh, one-twenty-seven, s, oh-b, forty." (Verbalization 3B).

In Example 3, no Hex Group Code names per se are used. However, the proposed groupings and verbalizations (Verbalizations 3A and 3B) are still more comprehensible and are more easily spoken than is the unbroken string of hex characters.

Additionally, individual preferences are a factor when using the Hex Group Code, as shown by Example 4.

Example 4: 0400 2FFF

This number may be verbalized as:

"oh-four, bi-zero, s, two, tri-f" (Verbalization 4A).

However some may prefer simply:

"four hundred, s, two, tri-f" (Verbalization 4B),

where three characters in the first group are thought of as "four hundred."

Note the importance of the ‘s’ which denotes the space between four-character groups, as seen in the last example. If one were to leave out the ‘s’ and say:

“four hundred, two, tri-f,”

the number could be misconstrued as:

“*four hundred two*, tri-f,”

which is: 0402 FFF,

where the space that should group the four least-significant characters (2FFF) has been deliberately misplaced to show the hearer’s possible confusion.

In some cases, neither a Hex Group Code name nor a two- or three-character grouping is possible, as with the group: AC2B. One must then resort to the traditional character-by-character method of naming/verbalization. However, there are a great many situations involving lengthy hexadecimal numbers, which do lend themselves to the grouping and Hex Group Code naming scheme described above.

By placing hexadecimal numbers in four-character groups and using the proposed Hex Group Code naming convention wherever possible, it is believed that the comprehension of lengthy hexadecimal numbers both from written material and in conversation will be improved. Additionally, the general tediousness of using such numbers as part of engineering and computer science tasks should be significantly reduced.

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